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{APEX DVD DECK DEFEATS ANTI-COPY CODING -- OUR LAB TEST:} Based on lab test and extensive evaluation, we've confirmed that Chinese-made Apex DVD player has "secret menu" that can reset regional coding -- and turn off Macrovision copy protection and DVD Content Scrambling System (TVD Feb 7 p11). Bargain-priced deck, sold primarily through Circuit City, also permits display of PAL-format discs on NTSC set, and vice versa.

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Apex AD-600A first drew attention for ability to play MP3 compressed music recorded on blank CD+R/W discs, making it first deck in U.S. to incorporate MP3 decoder and multi-read laser for recordable CDs. Player also boasts component video output and multistandard TV operation, features seldom seen even in midline decks let alone model that sells for \$149-\$199, depending on CC store. Other features include S-Video output; digital coaxial audio output for Dolby Digital, DTS or MPEG-2 audio; Video CD (VCD) and Super VCD playback including karaoke discs, for which deck has 2 microphone inputs for sing-along.

\$179.99 - MT. View

Unique features and attractive price alone would have made Apex player popular, although our lab measurements reveal just-average video and audio performance. But interest in deck

skyrocketed when reports appeared on Internet touting "secret menu" that enables owner to defeat DVD regional coding, CSS encryption and Macrovision copy protection. Ontario, Cal.-based Apex Digital doesn't promote menu features or reveal them in manual, which carries all usual regional coding and copyright advisories. Deck even ships to U.S. preset to Region 1. But this won't be first or last time that clever hackers find trap doors into DVD operating systems.



Menu-modifications worked as reported on Apex deck we bought at CC for testing. Actual onscreen display says "Loopholes Menu" and carries message "You Should Not Be Here." In our hands-on evaluation, we used remote control to switch among regional codes or set deck to all-region play. Separate menu for turning Macrovision off enabled us to make videotape copies of Macrovision-encoded DVDs; with copy protection turned on, tape copies had characteristic Macrovision ColorStripe marring picture. This was evident only from Region 1 DVDs for NTSC; ColorStripe didn't carry through to tape from Region 2 PAL discs.



Meanwhile, defeating CSS seemed self-defeating. Variety of Region 1 and 2 discs we tried failed to play correctly without CSS decryption. Typical symptoms of scrambling included stuttered audio accompanied either by no picture, or by fragmented and pixilated images. These, like occasional clear frame, ultimately froze onscreen --and image wouldn't change when movies were advanced to subsequent chapters on discs, although in some cases stuttering soundtrack did advance. Exception to failed playback was PAL version of Bean (Polygram), which ran just fine with CSS turned off. Although labelled Region 2, disc in fact has no regional coding -- rare for big title from major studio though not unusual for budget



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titles from smaller labels. When CSS was restored, all discs played correctly. As expected, setting of CSS function had no effect on performance of VCDs or audio CDs of any type, including MP3-compressed discs.

Rationale for turning off CSS encryption is puzzlement, as are menu items for turning off Automute and Dither. Possibility exists that ability to override CSS is hedge against future, when home recording made on products such as DVD camcorder might not have scrambling and "key" that CSS-equipped deck requires to play them. Apex player has analog video outputs only, and no obvious way to take descrambled digital bitstream from deck. We checked circuit board where decoding is done, and found no test-points or other obvious places where tap could be made to divert descrambled bitstream to digital recording device, such as PC's hard drive. With current lack of consumer recorders with DVD-quality removable media, exercise seems pointless unless program were transmitted over Internet or copies onto multiple VCDs with inferior quality.

Hands-on evaluation confirmed MP3 playback in Apex, though deck is finicky and wants disc to be formatted with titles in track-root. It was possible to skip forward and backward among tracks, but not fast forward or reverse within tracks. Test also verified that Apex player has multiread laser to read CD-R and even less-reflective CD+RW discs. Deck rejected computer DVD-ROMs and CD-ROMs but had no trouble with hybrid movie discs such as The Matrix, which have DVD-ROM like interactive features.

Deck's other impressive feature was NTSC-PAL conversion. By selecting NTSC display in general menu (other choices are for multistandard and PAL sets), Region 2 PAL discs played well on NTSC monitor. Color was perfect and there was no 50 Hz PAL roll, although picture had some artifacts attributable to conversion from 625-line PAL to 525-line NTSC. These included very slight vertical compression of images in 4:3 aspect ratio programs, somewhat more obvious vertical elongation when 16:9 ratio program is displayed as letterbox on 4:3 set. Apex also handled VCDs without trouble, either NTSC or PAL.

Apex deck's obvious violations of licensing agreements for CSS, regional coding and Macrovision drew muted response when we queried parties responsible for enforcement. Spokesman for DVD Copy Control Assn. that administers CSS license told us group "is aware of reports problems with these machines and is looking into them, and will respond appropriately when it is determined how serious they are." Macrovision spokesman said company's "extremely concerned" and investigating situation. Spokesmen for CC wouldn't comment, reiterating chain's policy that it does not participate in trade press reports. Apex spokesman didn't return our calls, and in past wouldn't reveal who manufactures deck. But apparent OEM in China is Visual Disc & Digital Video Corp., whose Web site prominently lists selection of Apex-branded players with option to defeat regional coding and copy protection systems.

Performance-wise, Apex deck has respectable specs although not as good as other Chinese-made players in same price range we've tested (TVD Sept 20 p10). These were Konka and Oritron decks which compared favorably with lab's previous measurements on 2nd-generation decks from 2 major brands in \$750-\$850 range, as well as \$650 first-generation deck that used mostly discrete components, such as decoders for MPEG-2 video and Dolby Digital. Point is important, as Apex, Konka and Oritron decks are gutless wonders with only DVD drive and handful of ICs under hood. Electrical measurements were conducted by Advanced Product Evaluation Laboratory (APEL), independent test facility in Bethel, Conn. APEL was CBS lab before privatization and routinely tests CE products for publications, major retailers, govt. departments, others. Tests were supervised by Frank Barr, APEL pres. and veteran engineer, and comprised industry-standard measurements for video and audio performance.

Apex deck was middling in video frequency-response, which measures resolution or sharpness of decks' output. AD-600A measured -4.15 rolloff at 6 MHz point, meaning deck delivers somewhat less than full 480-line horizontal resolution inherent to DVD format. By way of comparison, best frequency response APEL has measured to date was down just -0.18 dB at 6 MHz -- in \$850 deck. Color Purity of Apex deck was "very good" as measured on vectorscope for color red that's challenge for video to reproduce accurately. In general, DVD players render red better than analog video products. So, "very good" rating is relative to other DVD decks we've tested: It's within vectorscope's target for red -- not veering toward magenta or yellow -- but not dead-on bull's-eye.

Video signal-to-noise ratio was just fair compared with other decks. In this test for luminance noise, Apex measured 49.6 dB at composite video output and 52 dB for S-Video. This compares with 63.8 dB and 64.5 dB respectively for Oritron DVD200, which measured among best. As for color signal-to-noise (red field chroma), Apex measured 68 dB in AM modulation through composite video output. Test disc used for procedure, Avia DVD1001 from Ovation Software, wasn't available for our previous tests. But APEL's Barr said chroma noise reading was respectable. Other test discs used for APEL measurements were Video Essentials and Sony HLX-4001 for video, CBS CD-1 and Pierre Verany discs for audio. Display monitor used for visual evaluation was 27" Toshiba CN27H95 with component video inputs.

Dicier area of performance for all DVD decks is staircase-linearity, which tests player's ability to correctly resolve shades of gray from black to white -- fundamental building blocks of video picture. Measurement for staircase linearity is expressed as percentage, which, relative to perfection (0%), tells how closely deck comes to resolving shade correctly. That seldom occurs at more than one step among 10 in test, with any DVD player APEL has tested to date. Apex deck was no different -- but had far wider swings than we've seen in past. At step for black deck came within 75% of resolving shade; step for white was within 8% of accuracy. At intermediate steps, deviation ranged

from 5% to 10%.

Apex deck made up for video shortcomings though when picture was displayed from its component video outputs. Compared with composite output that was just good, picture quality from component video was noticeably better in terms of color depth and purity, less video noise and fewer artifacts such as dot-drawl. Difference would be obvious even to untrained eye. Oddly, Apex labels its Y-Cr-Cb component outputs "ColorStream" -- which is term trademarked by Toshiba. It's not clear why Apex uses term, but possible explanation lies in coincidence that owner's manual for AD-600A is nearly identical clone of those for earlier Toshiba SD-2108 and SD-3109 DVD players.

Audio numbers for Apex were on par with other Chinese decks though not as good as others lab has measured, but Barr said in most cases that's irrelevant because difference is measurable but not audible. AD-600A showed flat frequency response out to 20 kHz, where signal dropped 2.79 dB -- about 2x that of other Chinese decks. Rolloff had been fraction of dB in decks previously measured. In audio signal-to-noise ratio, Apex weighed in at 89.3 dB, and dynamic range measured was 91.1 dB. Measurements have averaged 100 dB in each category for some players tested in past.

Meanwhile, harmonic distortion is virtually nonexistent in Apex player or any others. And, channel separation was sufficiently wide (79.7 dB) to prevent any audible crosstalk between left and right channels of stereo signal. Good measurement also ensures accurate steering among channels in Dolby surround-sound modes. Previously, best separation measured was 91 dB.

In hands-on evaluation, Apex compared favorably to any we've seen. Under hood, construction was solid, with state-of-art electrical grounding and unique shielding that completely enclosed main circuit board -- and acted as heat-sink. Although 120v AC player lacks universal power supply, it will work off 50Hz or 60 Hz service. DVD drive was whisper quiet, with 2.2-sec. scan time from instant of disc insertion, speed typical of all drives. Drive is supplied by Digital Video Systems from Korea, model DSL600A using version LD10 firmware. Main microprocessor is ES4308 Video Drive from Fremont, Cal.-based ESS Technologies. Latter said that besides decoding MPEG-2 video and audio, Dolby Digital, and MPEG-1 VCDs, its Swan-DVD Solution chip controls DVD navigation and Content Scrambling System. It also has SmartScale feature that performs NTSC to PAL conversion and vice versa. ESS claims it also supplies chip to DVD makers Acer, Diotech, Labway, Raite, Sampo and Sony in Taiwan, and Apex, Panda, QiSheng and Wyanin China.
